

Application No.: 10/555,657

Amendments to the Drawings:

Fig. 3 is amended to designate it as --Prior Art--. The amended Fig. 3 is attached as a Replacement Sheet.

REMARKS

This Amendment is filed in response to the Office Action dated May 3, 2007 and the personal interview of June 14, 2007. For the following reasons this application should be allowed and the case passed to issue. No new matter is introduced by this Amendment. The amendment to claim 1 is supported by paragraph [0009]. Claims 2-6 are amended to maintain proper consistency with amended claim 1. Claim 7 is amended to correct an informality. Support for new claim 10 is found in claims 1 and 2, as originally filed. New claims 11-15 are supported by originally filed claims 3-7, respectively. Originally filed claims 1 and 3 provide support for new claim 16. New claims 17-20 are supported by claims 4-6, as originally filed.

Claims 1-20 are pending in this application. Claims 1-9 have been rejected. Claims 1-7 have been amended in this response. New claims 10-20 have been added in this response.

A certified English translation of the Japanese Priority Document, JP 2004-041106 is attached to this response.

Interview Summary

Applicants greatly appreciate the courtesy of Examiner Lee in granting a personal interview with the undersigned, and Messers Kuranaka, Fukumoto, and Kamata on June 14, 2007. During the interview, the undersigned presented proposed claims to distinguish over the cited references. The undersigned explained that Koike does not disclose the claimed particle shapes, and only discloses either spherical or substantially spherical particles. The Examiner agreed that the shape of the particles, as shown in Fig. 1 was different from the prior art particle shape, as shown in Fig. 3. The Examiner indicated that the proposed amendments and arguments would be considered if presented in a written response.

Amended claim 1 and new claims 10 and 16 presented in this response correspond to the proposed claims discussed during the personal interview.

Objection to Drawings

The Examiner asserted that Fig. 3 should be designated as --Prior Art--.

In response to this objection, Fig. 3., has been amended to designate it as --Prior Art--.

Claim Rejections Under 35 U.S.C. § 112

Claim 7 was rejected under 35 U.S.C. § 112, second paragraph, as being independent because it was unclear as to what is meant by “derivative”. This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

Claim 7 has been amended to correct the asserted informality. Applicants submit that the present claims fully comport with the requirements of 35 U.S.C. § 112.

Claim Rejections Under 35 U.S.C. § 103

Claims 1-6, 8, and 9 were rejected under 35 U.S.C. § 103(a) as obvious over Koike (JP 07-220759). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the invention, as claimed, and the cited prior art.

An aspect of the invention, per claim 1, is a secondary battery comprising: a positive electrode; a negative electrode; a porous electron-insulating layer adhered to a surface of at least one selected from the group consisting of the positive electrode and the negative electrode; and an electrolyte. The porous electron-insulating layer comprises a particulate filler and a resin binder. The particulate filler substantially comprises indefinite-shape particles which have the shape of dendrites, grape clusters, or coral.

Another aspect of the invention, per claim 10, is a secondary battery comprising: a positive electrode; a negative electrode; a porous electron-insulating layer adhered to a surface of at least one selected from the group consisting of the positive electrode and the negative electrode; and an electrolyte. The porous electron-insulating layer comprises a particulate filler and a resin binder. The particulate filler substantially comprises indefinite-shape particles, wherein a neck is formed between at least a pair of single crystalline particles that are joined to one another and that form the indefinite-shape particles.

Another aspect of the invention, per claim 16, is a secondary battery comprising: a positive electrode; a negative electrode; a porous electron-insulating layer adhered to a surface of at least one selected from the group consisting of the positive electrode and the negative electrode; and an electrolyte. The porous electron-insulating layer comprises a particulate filler and a resin binder. The particulate filler substantially comprises indefinite-shape particles, wherein the indefinite-shape particles are polycrystalline particles comprising a plurality of single crystalline particles that are diffusion bonded.

The present claims are not obvious in view of Koike because Koike does not suggest that the particulate filler substantially comprises indefinite-shape particles which have the shape of dendrites, grape clusters, or coral, as required by claim 1; a neck is formed between at least a pair of single crystalline particles that are joined to one another and that form the indefinite-shape particles, as required by claim 10; and the indefinite-shape particles are polycrystalline particles comprising a plurality of single crystalline particles that are diffusion bonded, as required by claim 16.

Secondary batteries comprising a porous electron-insulating layer according to embodiments of the present invention have improved charge/discharge characteristics at high

rate charge/discharge and low temperature charge/discharge. Porous electron-insulating layers formed using spherical or substantially spherical particles tend to form higher-density, lower-porosity layers (specification at paragraph [0006]). On the other hand, porous electron-insulating layers comprising indefinite shape particles do not form layers as dense as substantially spherical particles because of the complicated shapes of the indefinite shape particles (specification at paragraphs [0015] and [0016]). Thus, porous electron-insulating layers with higher porosity are formed providing a significant improvement in high-rate and low-temperature charge/discharge properties (specification at paragraph [0015]).

As clearly illustrated in Figs. 1 and 2, Koike disclose that the particles are either spherical or substantially spherical. Further, contrary to the Examiner's assertion on page 4 of the Office Action, Koike does not disclose that the particles are formed by a similar process as disclosed in the present specification. Rather, Koike is largely silent as to how the particles are formed. Koike (paragraph [0027]) teach that a slurry of fine particles is prepared by dispersing fine particles and binders in a solvent that is applied on the surface of the electrode active substance layer. In paragraph [0058], Koike further teach mixing 72 parts by weight alumina powder with 3 parts by weight PVDF and 25 parts by weight N-methyl pyrrolidone to obtain a fine particle slurry. There is no further teaching of the conditions and parameters of the method of forming the protective film material of Koike. Thus, Koike clearly does not disclose that the particles are formed by a similar process as disclosed in the present specification.

Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313,

1317 (Fed. Cir. 2000); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). There is no suggestion in Koike to modify the Koike secondary battery so that it comprises a porous electron-insulating layer, wherein the porous electron-insulating layer comprises a particulate filler substantially comprising indefinite-shape particles which have the shape of dendrites, grape clusters, or coral, as required by claim 1; a neck is formed between at least a pair of single crystalline particles that are joined to one another and that form the indefinite-shape particles, as required by claim 10; and the indefinite-shape particles are polycrystalline particles comprising a plurality of single crystalline particles that are diffusion bonded, as required by claim 16.

The only teaching of the claimed secondary battery is found in Applicants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must not be based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Claim 7 was rejected under 35 U.S.C. § 103(a) as obvious over Koike in view of Waterhouse (U.S. Pat. No. 4,363,856). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

The combination of Koike and Waterhouse does not suggest the claimed secondary battery because Waterhouse does not cure the deficiencies of Koike. Waterhouse does not suggest a porous electron-insulating layer, wherein the porous electron-insulating layer comprises a particulate filler substantially comprising indefinite-shape particles which have the shape of dendrites, grape clusters, or coral, as required by claim 1.

The dependent claims are allowable for at least the same reasons as the independent claims from which they depend, and further distinguish the claimed secondary batteries.

In view of the above amendments and remarks, Applicants submit that this application should be allowed and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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